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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/766,872

01/30/2004

Jeffrey T. Wetzel

247562US6YA

4092

22850

7590

01/25/2006

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ALEXANDRIA, VA 22314

EXAMINER

WARREN, MATTHEW E

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/766,872	Applicant(s) WETZEL ET AL	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 6-19 and 37-43 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-19 and 37-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some    c) ☐ None of:
    - 1. ☐ Certified copies of the priority documents have been received.
    - 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                   |
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| <ul style="list-style-type: none"> <li>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br/>Paper No(s)/Mail Date <u>4/30/04</u>.</li> </ul> | <ul style="list-style-type: none"> <li>4) <input type="checkbox"/> Interview Summary (PTO-413)<br/>Paper No(s)/Mail Date. _____</li> <li>5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)</li> <li>6) <input type="checkbox"/> Other: _____</li> </ul> |
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## DETAILED ACTION

This Office Action is in response to the Amendment filed on November 9, 2005.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-19, and 37-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bekiaris et al. (US Pub. 2003/0119307 A1) in view of Sandhu et al. (US Pub. 2005/0056949 A1).

In re claims 1, 37, and 38, Bekiaris et al. shows (fig. 5C) a semiconductor device comprising; a semiconductor substrate (50) a film stack (110 and 120) formed on the semiconductor substrate and including a film to be processed (116), a dual hard mask (120) comprising an amorphous carbon layer (124) and an underlying hard mask layer (122) interposed between the amorphous carbon layer and the film to be processed, said hard mask layer not including an amorphous carbon layer [0037-0039 and 0054]; and a damascene structure [0036] for a metal interconnect formed in the film stack. Bekiaris shows all of the elements of the claims except the amorphous carbon layer having at least one optical property that substantially matches the corresponding optical property of the film stack. It would have been obvious to one of ordinary skill in the art at

the time the invention was made to form the amorphous carbon layer having optical properties matching the film stack since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Although such a limitation is merely on optimization of a material, Sandhu et al. discloses [0016 or 0037] that an amorphous carbon mask layer (330) can be modified, thus changing the optical properties of the mask layer so that it is transparent. If the mask is transparent and the underlying film (220) is transparent so that alignment marks (14) on a substrate are noticeable, then amorphous carbon mask layer has the optical property of being transparent just as the film stack does. Furthermore, because the amorphous carbon layer is the same material as the instant invention and is transparent, it inherently is an anti-reflective layer. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the dual mask layer of Bekiaris by modifying the amorphous carbon layer to have the same properties as the underlying film as taught by Sandhu to make the film stack transparent and thus allowing discernment of alignment marks formed on a substrate.

In re claim 2, Bekiaris discloses that said amorphous carbon layer comprises a part of a lithographic structure during the formation of said metal interconnect in said film stack [0043].

In re claims 3 and 4, concerning the limitations of the amorphous carbon layer comprising a CMP stop layer or an anti-reflective coating, such limitations constitute an intended use. It has been held that a recitation with respect to the manner in which a

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claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F. 2d 1647 (1987).

In re claims 6 and 9, concerning the amorphous carbon layer having the listed optical properties, the amorphous carbon layer of Bekiaris and Sandhu inherently has the optical property of an index of refraction and an extinction coefficient since the materials and structure are the same as the instant invention.

In re claims 7, 8, 10, and 39-43 Bekiaris and Sandhu do not specifically disclose the index of refraction or the extinction coefficient within the desired range, however, it would have been obvious to one of ordinary skill in the art to make the index of refraction or extinction coefficient within the desired range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claim 11, Bekiaris discloses [0039] that said amorphous carbon layer comprises at least one of chemical vapor deposition (CVD) coating, and plasma enhanced CVD coating.

In re claim 12, concerning the amorphous carbon layer being configured to control of a critical dimension, it has been held that the recitation that an element is "configured to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchison*, 69 USPQ 138.

In re claims 13 and 14, Bekiaris discloses [0030] that said damascene structure is a single damascene structure or a dual damascene structure.

In re claim 15, Bekiaris discloses [0036] that said film to be processed (116) comprises a low-k dielectric layer.

In re claims 16-19, Bekiaris discloses that said hard mask layer [0037, 0038, 0054] comprises silicon nitride, carbide, or oxycarbide.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-4, 6-19, and 37-43 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

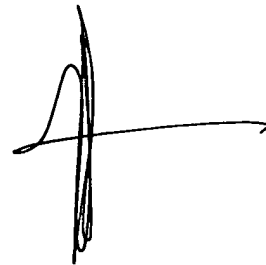
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEW  
*MEW*  
January 20, 2006

A handwritten signature in black ink, appearing to be 'K Parker', with a horizontal line extending to the right.

KENNETH PARKER  
SUPERVISORY PATENT EXAMINER